Errata

Agilent References in this manual

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Select your country from the drop-down menu at the top. Under *Electronic Test and Measurement*, click on *Services*. The web page that appears next has contact information specific to your country.

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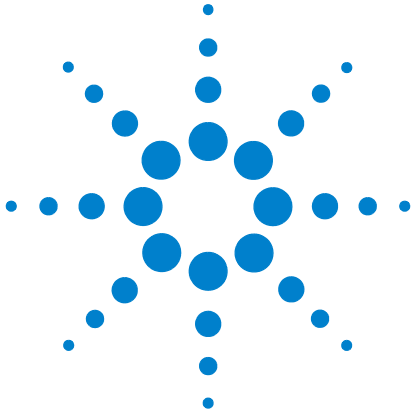
KEYSIGHT TECHNOLOGIES



Agilent 34946A-34947A Microwave Switch/Driver Modules

User's Guide

Agilent Technologies, Inc.
Printed in Malaysia
Edition 3
March 2013 E0313

34980-90046

Agilent Technologies

Notices

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Manual Part Number

34980-90046

Edition

Third Edition, March 2013

Printed in Malaysia

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Santa Clara, CA 95052 USA

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Software Revision

This guide is valid for the firmware that was installed in the instrument at the time of manufacture. However, upgrading the firmware may add or change product features. For the latest firmware and documentation, go to the product page at:

www.agilent.com/find/34980A

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CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Additional Safety Notices

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings or instructions elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability of the customer's failure to comply with the requirements.

General

Do not use this products in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

Before Applying Power

Verify that all safety precautions are taken. Make all connections to the unit before applying power.

Ground the Instrument

This product is provided with protective earth terminals. To minimize shock hazard, the instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

Do Not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

Do Not Remove the Instrument Cover

Only qualified, service-trained personal who are aware of the hazards involved should remove instrument covers. Always disconnect the power cable and any external circuits before removing the instrument cover.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

In Case of Damage

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Safety Symbols

Alternating current

Frame or chassis terminal

Standby supply. Unit is not completely disconnected from ac mains when switch is off

Caution, risk of electric shock

Caution, refer to accompanying description

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This product complies with the WEEE Directive (2002/96/EC) marking requirement. The affixed product label (see above) indicates that you **must not discard this electrical/electronic product in domestic household waste**.

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In Europe: 31 20 547 2111
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- Alternately, you can go to the product web page (www.agilent.com/find/34980A), click on the Document Library tab then scroll down until you find the Declaration of Conformity link.

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34946A and 34947A Dual/Triple Microwave Switch Modules

The 34946A and 34947A modules provide single-pole, double-throw switches in 4 GHz, 20 GHz, and 26 GHz options. The 34946A and 34947A modules are also available with no switches installed - but include cable kits that allow you to connect switches external to the module chassis. The configuration options of the modules are summarized below:

34946A Dual 1x2 SPDT Terminated Microwave Switch	34947A Triple 1x2 SPDT Unterminated Microwave Switch
Option 001: No switches installed Option 004: 4 GHz switches installed Option 020: 20 GHz switches installed Option 026: 26 GHz switches installed	Option 001: No switches installed Option 004: 4 GHz switches installed Option 020: 20 GHz switches installed Option 026: 26 GHz switches installed
Supported Switches: Agilent N1810UL Unterminated 3-port SPDT Agilent N1810TL Terminated 3-port SPDT Agilent N1811TL Terminated 4-port transfer Agilent N1812UL Unterminated 5-port transfer	Supported Switches: Agilent N1810UL Unterminated 3-port SPDT
Required N1810 options: Opt. 124 -- 24 Volt coil voltage Opt. 201 -- “D” subminiature 9-pin female connector Opt. 402 Position indicators	Required N1810 options: Opt. 124 -- 24 Volt coil voltage Opt. 201 -- “D” subminiature 9-pin female connector Opt. 402 Position indicators
Switch reference document number: 5968-9653E	Switch reference document number: 5968-9653E
34946A Option 001 contains cables and connectors to support two of the supported switches listed above. **34947A Option 001** contains cables and connectors to support three Agilent N1810UL switches.	

The 34946A and 34947A modules do not connect to the analog buses. Instead, all connections are made through the visible SMA connectors via external cables. Each connector on the modules is labeled with a three-digit number that represents a channel you can control programmatically from the front panel or from the Web UI.

NOTE

There are several suppliers of RF cables and connectors used with Agilent switches. Three suppliers are listed below:

Pasternack Enterprises, Inc.	http://www.pasternack.com
Micro-Coax®	http://www.micro-coax.com
S. M. Electronics L.L.C.	http://www.smelectronics.us

CAUTION

The 34946A and 34947A support only 24 VDC coil options for the N1810 switches. If the proper voltage option (Opt. 124) is not used, the switches could be damaged.

The 34946A module (Options 004, 020, 026) has two independent Agilent N1810TL switches. These terminated 3-port 50-ohm switches are designed to maintain impedance matching. The 34947A module (Options 004, 020, 026) contains three independent Agilent N1810UL switches. These higher density 3-port switches are unterminated. For channel configuration on each module, refer to the simplified schematics on page 5.

The 34946A and 34947A modules implement a *verification* (position indication) feature, which senses the actual hardware state of the specified channels following a `ROUTe:CLOSe` or `ROUTe:OPEN` operation. If a switch operation appears to have failed, an error will be generated at the time the `ROUTe:CLOSe` or `ROUTe:OPEN` command is executed. An error will be generated for each channel operation that did not properly verify. The verification process will slow overall switching performance on the module.

34946A and 34947A Option 001 Installation

Option 001 to the 34946A and 34947A is a 30-pin ribbon connector to 9-pin D-Sub connector cable kit. The option allows you to connect two (34946A) or three (34947A) switches external to the instrument chassis.

NOTE 34946A Option 001 and 34947A Option 001as purchased meet all safety and EMC regulatory requirements. Any modifications or additions to the options and their conformance to local regulatory requirements are the responsibility of the user.

The steps for installing the cable assembly and 9-pin D-Sub connectors are as follows:

1. Remove the 34946A or 34947A cover by removing the screw (T-10 torx) on the top of the instrument (Figure 1).

CAUTION Use care when handling the 34946A or 34947A chassis with the cover removed as components within the chassis are susceptible to damage from ESD.

2. Insert the ribbon cable into the connector on the printed circuit board as shown (Figure 1).

3. **34946A** - Route the center and left 9-pin strands through the corresponding slots of the instrument face plate (Figure 1). Cut the cable strands to the desired length, or if necessary, the full length of the strands can be used.

Do not attach the D-Sub connector (Step 4) until the strands have been routed through the face plate slots.

3. **34947A** - Route the right, center, and left 9-pin strands through the corresponding slots of the face plate as shown (Figure 1).

Cut the cable strands to the desired length, or if necessary, the full length of the strands can be used.

Do not attach the D-Sub connector (Step 4) until the strands have been routed through the face plate slots.

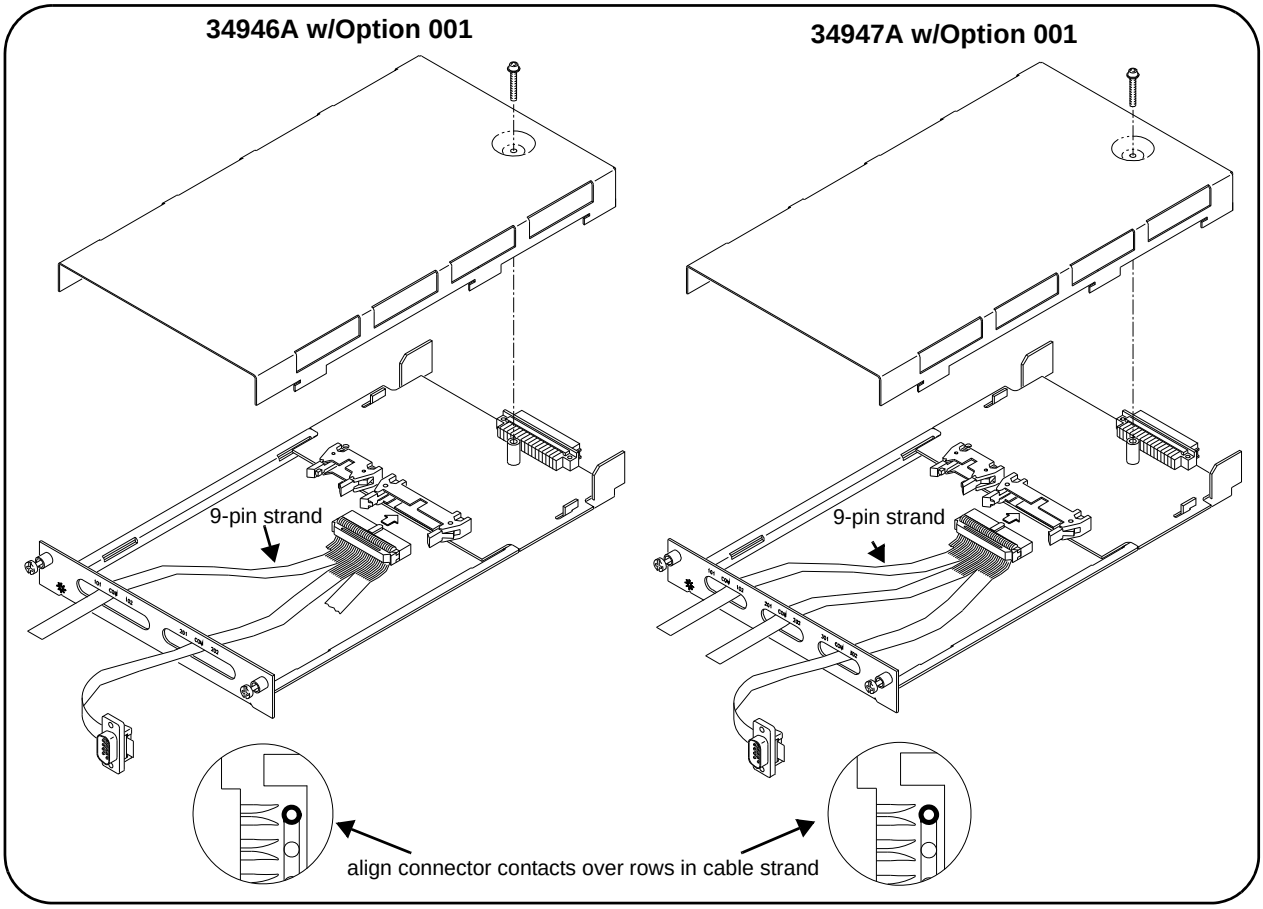

Figure 1. 34946A and 34947A Option 001 Installation.

4. Insert the ribbon cable strand into the D-Sub connector as shown. Align the metal contacts of the connector over the pins. Press the connector onto the strand using a vise or clamp to press the contacts evenly through the cable insulation. Continue to press the connector until the metal contacts are no longer visible. Remove any excess part of the strand protruding through the connector.

5. Fold the excess ribbon cable length back into the chassis body behind the faceplate. Re-attach the instrument cover and tighten the torx screw to secure the cover in place.

The pinouts of the N1810/11/12 switches and of the D-Sub connector are shown in Figure 2. Note that the pin numbers of the switch are defined as shown, not as printed on the connector.

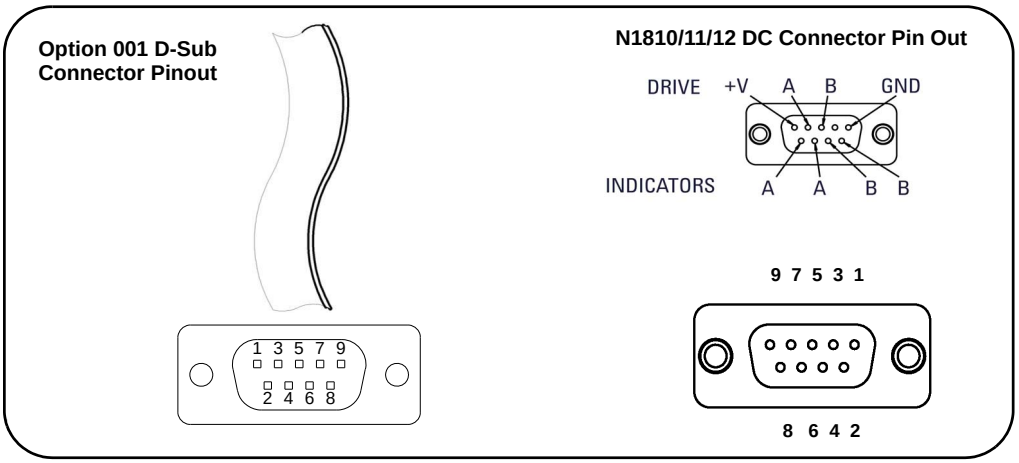

Figure 2. N1810/11/12 Switch and D-Sub Connector Pinouts.

34946A and 34947A SCPI Programming Examples

The programming examples below provide you with SCPI command examples to use for actions specific to the microwave switch modules.

The slot and channel addressing scheme used in these examples follow the form **sccc** where **s** is the mainframe slot number (1 through 8) and **ccc** is the three-digit channel number. For information on specific configurations, refer to the simplified schematics in this chapter.

For complete information on the SCPI commands used to program the 34980A, refer to the Agilent 34980A Programmer's Reference contained on the 34980A Product Reference CD. For example programs, also refer to the 34980A Product Reference CD.

Example: Closing channels You can use the `ROUTe:CLOSe` to close channels on the microwave switch modules, but these modules do not support the `ROUTe:OPEN` command. You can open channels by closing other channels. With this "one-step" operation, the relays switch in the proper order that avoids momentary connection of the wrong input to the switch output. The following statement closes channel 201 of a microwave switch module installed in slot 5.

```
ROUTe:CLOSe (@5201)
```

Example: Querying channels for open or close state The following command returns the open (1) or close (0) state of channel 202 for a module in slot 3.

```
ROUTe:CLOSe? (@3202)
```

Example: Querying the system for module identify The following command returns the identify of the module installed in slot 7.

```
SYSTem:CTYPe? 7
```

Example: Reading the cycle count for a relay The following command reads back the number of completed cycles for the channel 201 relay of a module installed in slot 6.

```
DIAGnostic:RELay:CYCLes? (@6201)
```

Example: Clearing the cycle count for a relay The following command resets the cycle count on channels 201 and 202 for a module in slot 1.

```
DIAGnostic:RELay:CYCLes:CLEar (@1201,1202)
```

Example: Resetting Module(s) to Power-On State The following command resets a module in slot 4 to its power-on state.

```
SYSTem:CPON 4
```

Example: Enabling Verification The following command enables verification on channels 201 and 202 for a module in slot 1. When verification is enabled, the actual hardware state of each relay is sensed for the correct state.

```
ROUTe:CHANnel:VERify:ENABle ON,(@1201,1202)
```

Installing SMA Connectors

When installing SMA connectors, it is recommend that you tighten them to 0.8 - 1.1 Nm (7-10 in-lbs) of torque.

34946A and 34947A Simplified Schematics

Figures 3 and 4 show the channel configurations for the 34946A and 34947A modules, respectively.

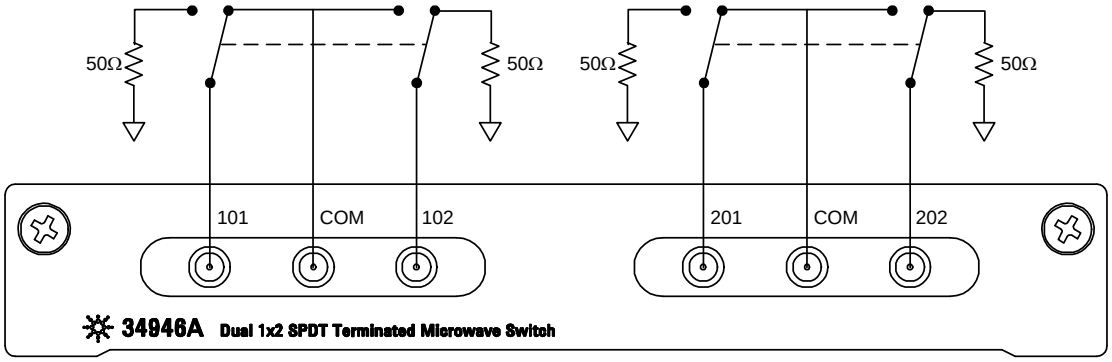

Figure 3. 34946A Simplified Schematic.

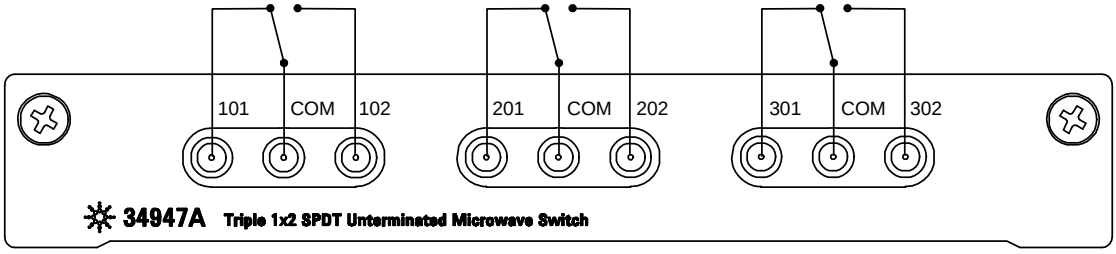

Figure 4. 34947A Simplified Schematic.

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